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THE ACTION OF THE INTERCOSTAL MUSCLES.

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THE action of the intercostal muscles has been a subject of discussion ever since they were described by Galen, A.D. 131. It would be superfluous, as well as tedious, to attempt to give a *résumé* of all the views which have been advanced, for it has been frequently more or less perfectly done, no writer ever failing to add some slight modification of his own. Both sets of intercostals have been held to be inspiratory, both to be expiratory, and both to be inspiratory and expiratory, and there is an equal difference of opinion concerning each considered separately; both have also been held to be of service merely as ligaments. In the first half of the eighteenth century, there was a spirited discussion on the subject between Haller and Hamberger, the former maintaining that both layers were inspiratory, the latter that the external layer and that part of the internal one situated between the cartilages were inspiratory, and the remainder of the internal one expiratory. Haller appears to have had the best of the argument, and his views prevailed until Hutchinson, in his celebrated article "Thorax," in the Cyclopædia of Anatomy and Physiology, declared for Hamberger. Since then, the tables have been turned, and, though frequently disproved in several points, Hutchinson's article continues to be quoted as authority by perhaps one half of those dealing with the subject. (In Europe, excepting Great Britain, the proportion of his defenders may not be so large; in America it probably is larger.)

The object of this paper is to show, chiefly by arguments already presented, that Hutchinson's views, resting on erroneous data, are entirely wrong; and secondly, to call attention to some original observations and experiments, and to some points in the laws of muscular action, nervous supply, and in the phenomena of respiration suggesting very different conclusions.

It is evident that the Hutchinsonian theory presupposes that all the ribs have an equal amount of motion, which is not the case. Now if any rib is fixed during any part of the respiratory act, it is clear

that these rules will not apply, and if any rib be hindered from sharing fully in the general motion, it is practically, to a certain extent, fixed, as regards the others, and the relations are disarranged. If one rib be fixed, the tendency of both sets of fibres will be to pull the next rib towards it; but this is made impossible, or more or less difficult, by the connection of the anterior ends of the ribs with the sternum, or with one another, except in the case of the last two. The elasticity of the ribs cannot be overlooked in this connection; from what has just preceded, it may be seen that, under certain circumstances, a rib may be more likely to bend, than to follow the motion of its neighbor, and the difference in elasticity in the different parts of the costal arch, tends to complicate the problem. Let it be remembered, that the ribs form parts of larger circles from above downward, and that in the upper part of the chest, each arch is in all positions outside of the one above it; and let it be remembered, that, besides the motion of rising and falling from the spinal column, the ribs have a rotary motion on a longitudinal axis. Now, in the upper part of the chest, both sets of fibres must pass outward and downward, so that their action might be represented on Hamberger's bars by turning the latter at right angles to their usual position, and putting the elastic bands in the place of those representing the external intercostals, namely, running downwards and away from the fulcrum. Thus, in the upper part of the chest, both layers must tend to raise the ribs. It has been said, with apparent justice, that mathematics furnish no safe guide when applied to the animal economy, and that we should look at nature and see what the fact is, rather than argue what it ought to be; but in this case, such reasoning is more plausible than true, for observation is very difficult, and vivisectors disagree in what they see; some claim to have observed the phenomena as they should be according to Hamberger, but others, and perhaps the more reliable, do not.

Moreover, observations on human beings are impossible, except under pathological conditions which almost necessarily affect the mechanical relations of the parts, and in lower animals the conditions are never the same as in man. Hence it is not unfair nor overhasty to declare Hamberger's views false in theory, and unconfirmed by observation.

At this point, I would call attention to some anatomical considerations before proceeding. The two layers of the intercostals form a double covering to the contents of the thorax, from the angles of the ribs to their cartilages; behind and in front, respectively, of these points, other muscles are found, to prevent any loss of power to counter-balance atmospheric pressure, to wit, the long muscles of the back behind, and the pectoralis major and external oblique in front. The internal oblique is not only in the same plane, but absolutely continuous with the fibres of the internal intercostals in the three or four lower spaces. Coming from the transverse processes of certain cervi-

cal vertebræ, we have three muscles called scaleni, two going to the first, and one to the second rib. In a continuous series with the scaleni, come twelve triangular muscles from the transverse processes of the seventh cervical and eleven upper dorsal vertebræ, to the ribs between their tubercles and angles, and continuous with the fibres of the external intercostals. Arising from the spinous processes, come next the two posterior serrati; the superior passing downward and outward, to be inserted into the second, third, fourth and fifth ribs beyond their angles, thus getting a favorable hold to draw them backward, and also to raise them in part by rotation on the antero-posterior axis. The inferior serrati extend upward to the four lower ribs, in a manner to draw them downward and backward. The quadratus lumborum forms part of the posterior wall of the abdomen, its fibres passing upward to about the inner half of the last rib, which it draws downward and backward. The action of the erector spinæ has a considerable influence on the shape of the chest, and the fibres of its outer division have a special action on the ribs. Its lower part (the ilio-costalis lumborum) sends fibres to the angles of the six or seven lower ribs, in a manner to draw them backward and downward, or at all events to hold them firmly. The upper part (cervicis*) will have a similar effect by drawing the superior ribs upward, and the middle part (dorsi*) will keep all tense by drawing the more movable toward the more fixed.

Leaving the intercostals for a moment out of the question, the combined action of the muscles just enumerated will be, while the erector straightens the spine, to draw the upper ribs upward, the lower downward, and the posterior part of all of them inward in a manner to enlarge the thorax transversely. The diaphragm remains to be considered; it has its firmest attachment to the spinal column, and a less fixed one to the circumference of the lower outlet of the chest. The central tendon is attached to the lower layer of the pericardium, and it is to be borne in mind that this is movable only to a certain degree, after which it acts as a fixed point.

With regard to the nervous supply, the most striking fact is that the diaphragm is supplied by two nerves (the phrenics), which arise chiefly from the fourth cervical, apparently to secure the chief muscle of respiration from the effects of an injury to the back. The intercostal nerves supply not only both intercostals, but the levatores, the triangularis sterni, the subcostals, and, according to Riedlaender, the posterior serrati. That a nerve of the size of an intercostal should supply two muscles, part of one of which is antagonistic to the other and to the other part of itself, and that it should stimulate the antagonists to alternate action, is an anomaly of the most startling kind; there is no parallel case to be found in the body.

Perhaps the fundamental error in most views on the action of these muscles is, that it is held to be a definite one—always the

* According to Henle's nomenclature.

same. This is not correct in this case, if, indeed, it be in that of any muscle. The mechanical function of a muscle may be said to be that of bringing, by its contraction, its two ends nearer together—drawing the more movable attachment to the more stable one. Let us take the biceps as an illustration—its usual action is to draw the hand towards the head; but let the hand be fixed, and it will draw the head toward the hand. Few muscles act alone; and the action of the biceps will be hindered or assisted by the contraction of others. Few if any points in the body can be spoken of as absolutely fixed; the hyoid group affords good examples of muscles whose chief duty it is to hold a structure steady to give support to others during their action; any uncommon contraction or relaxation of the former must affect the whole process. Besides contractility, muscles have also some elasticity, and, under certain circumstances, act purely as ligaments.

The blending of other muscles with the intercostals, particularly with the lower internal ones, goes far to prove that they can hardly have a purely independent action.

Far more astonishing than the difference of opinion about the intercostals, is that concerning the movements of respiration, and more especially the relative mobility of the ribs. Omitting all history, I would give the following as my conclusions, derived from the study of the movements in adult males. In the first place, it should be understood that the movements are not the same in all persons, and that in any person a slight cause is sufficient to modify the nature of the respiration. In the adult male, quiet respiration is almost purely abdominal; when the individual is sitting quite at rest, it is often nearly impossible to detect any movement in the thorax. When the chest takes part, the lower ribs are the first to be affected. Very delicate observation shows that they are for a moment fixed, and then drawn backward and outward, apparently to give greater firmness to the lateral attachments of the diaphragm, and then, if the inspiration should have been strong enough to raise the upper part of the thorax, they may follow the other ribs; but this I believe not to be their primary movement. In forced inspiration, the lower ribs are sometimes drawn decidedly inward.

The first rib is undoubtedly sometimes raised, but this is the point in which I am inclined to think there is the greatest individual variation. The amount of rotation is probably greatest from the sixth to the eighth. In an inspiration but very little stronger than usual, there is a tendency to straighten the spine, which is very marked if the inspiration be forced; this is not only, as Mr. Hutchinson has shown, to allow the ribs to widen the intercostal spaces as they rise, but also to give a firmer origin to the scaleni, the levatores, the serrati and the strips from the erector spinæ.

It has been shown that all these movements can take place without any assistance from the intercostals, other than that of dragging one

rib after another as ligaments might do. Küss accounts for their arrangement in two oppositely oblique layers by the fact that thus, in any position of the ribs, one is always on the stretch, which no doubt is necessary for proper resistance to atmospheric pressure. But though the motions of respiration may be performed without their assistance, it does not follow that they do not even normally take a part.

To gain some observation of the action of these muscles, I irritated them by striking and by galvanism, just after death, in a dog in which the costal cartilages of one side had been divided close to the sternum. The galvanic irritation was made by putting the two wires of the battery in a vertical line at each edge of the same intercostal space. The effect was to bring the two ribs together—the lower sometimes almost overlapping the upper. On cutting away the external intercostal, the same result, though in a less degree, was obtained.

Wishing to see the normal action of these muscles in a dog, although holding that the results would not necessarily apply to man, I had recourse to a vivisection, for the success of which I am greatly indebted to Dr. Amory. A dog was etherized, bound down on its back, and one side of the chest laid bare. The opening, during inspiration, of the angle between the bony ribs and cartilages in the thorax was beautifully shown, and it was evident that the fibres of the intercostals were continually changing their condition. Just what these changes, however, might be, and just when they occurred, were unexpectedly difficult points to settle, and the difficulties were so great that I am inclined to look with increased doubt on the confident assertions of some authors.

I came to the conclusion, that the external intercostals, and the internal ones between the cartilages, did contract during inspiration; but the contraction was very slight, and the doubt grows stronger in my mind whether the bulging attributed to contraction was not really the relaxation caused by the approximation of the ends of the fibres. The lower ribs were fixed and often drawn a little backward at the beginning of inspiration, but in spasmodic inspiration were drawn directly downward. Galvanism was applied between the long ribs, as in the former experiment, with both muscles intact, and sometimes with one, sometimes with the other layer divided. In all these cases the ribs were drawn together. When the internal intercostals between the cartilages of some of the higher ribs were galvanized during inspiration, the superior one ceased to ascend, and the inferior was drawn towards it. If one of the lower ribs was held fast and the muscles galvanized above it, the ribs above were drawn down.*

* Since reading this paper, I have had an opportunity, by the kindness of Dr. H. P. Bowditch, of repeating the experiment, with his coöperation. The only modification of importance was the section of the pneumogastrics, towards the end of the experiment, in order to make the respiration slower and more particularly thoracic. The results were identical with those of the other experiment, but I satisfied myself that my first impres-

Hence I concluded, first, that the action of the intercostals during ordinary respiration is very slight, if, indeed, there be any, other than ligamentous. Second, that for reasons given in an early part of this paper, both sets, at the upper part of the chest, tend to raise the ribs. Third, that owing to the fixing or drawing down of the lower rib, both sets in the lower part of the chest may tend to draw the ribs downward. Fourth, that by sudden contraction, drawing ribs together, they are muscles of spasmodic expiration. Fifth, that position, muscular action, disease, deformity, and various slight undefinable causes, may modify the action of any part of them.

N. B.—The writer would refer the reader to Professor Humphry's lecture, in the *British Medical Journal*, June 29, 1872, to Professor Cleland's paper, in the *Journal of Anatomy and Physiology*, vol. i. p. 209, and to Dr. Arthur Ransome's remarks in the *British Medical Journal*, Oct. 26, 1872. As the writer's views, except in some matters of detail, are nearly the same as those of the last-named gentleman, he would state that this paper was almost finished before he was acquainted with that of the latter.

A Criticism on the Vague Use of Terms.—In perusing the productions of medical writers, one is apt to be struck with the frequent use of terms which convey no definite idea, or which put assumptions and hypotheses for truth or fact. "Blood poisoning" has come to be a very convenient expression with which to cover up doubts and obscurities. We talk fluently of "cell-life" and its destruction by morbific agents, often using the terms, it may be, to conceal ideas rather than to give them a clear expression. "Malaria" is an invaluable blessing to our literature, enabling us to bridge over a thousand dark chasms into which neither our eyes nor our microscopes can penetrate. In talking with patients, the free use of such terms may be well enough. Unprofessional people must have explanations, and they seem to understand technicalities about in proportion to their ignorance of strict science. But among ourselves, in our discussions and lectures and writings, there is room for caution in this respect. Even when the writer may have a clear idea of his own meaning, the reader may not, or he may give a different meaning. Taking the three expressions which we have chanced to use in illustration, "blood-poisoning," "cell-life," and "malaria," let any half-dozen medical gentlemen compare notes as to their meaning, they will all doubtless agree up to a certain point. But when it comes to the application in specific cases, the difference would show out painfully. If *faith* were a handmaid of science, as she is of religion, there would be no great difficulty. We might talk after the manner of acknowledged leaders, and not insist on independent judgment. But in science, doubt and inquiry take the place of faith, and the use of terms in a vague or indeterminate sense is incompatible with strict science.—*Pacific Medical and Surgical Journal.*

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sions were right concerning the contraction of these muscles. I never succeeded in demonstrating the contraction of the internal intercostals between the bony ribs during expiration. It should be stated that none of these dogs were allowed to awaken from anæsthesia.

Progress in Medicine.

REPORT ON OPHTHALMOLOGY.*

By O. F. Wadsworth, M.D. Harv.

Anatomy.

Wolfring—Beitrag zur Histologie der Lamina Cribrosa Scleræ. Graefe's Archiv., xviii., ii.

Leber—Bemerkungen ueber die Circulations-Verhältnisse des Opticus und der Retina. Do. do.

Schwalbe—Ueber Lymphbahnen der Netzhaut und des Glaskörpers. Berichte der math.-phys. Classe der Königl. Sächs. Gesellschaft der Wissenschaften. June, 1872.

At the commencement of his paper, Wolfring tells us that his investigations were undertaken in the endeavor to solve the following questions: 1. In what relation does the connective-tissue of the sclera stand to that of the lamina cribrosa (the meshwork extending across the opening in the sclera through which the optic nerve enters the eye)? 2. What is the relation of the vascular anastomosis forming a circle in the sclera around the opticus, to the sclera, the lamina cribrosa and the sheaths of the nerve? 3. What is the distribution of lymph-vessels in these tissues?

As regards the distribution and relations of the bloodvessels, the results obtained by examination of eyes of infants, the vessels of which had been injected with a solution of Prussian blue in glycerine, agree, in the main, with those obtained previously by Leber, and directly confirm them, but are less complete. On one point, however, and that an important one, there is some vagueness in the language used, and a possible discrepancy. In describing the vessels which form an anastomosing meshwork on the inner sheath of the nerve, Wolfring speaks of vessels which come from the brain to take part in this anastomosis, or join the vascular circle in the sclera. It does not clearly appear whether by this is intended merely to indicate the direction those vessels take, or whether they are regarded as of directly intracranial origin. The latter would be decidedly opposed to Leber's views.

Leber has, by renewed investigation, satisfied himself of the correctness of his previously published statements† regarding the bloodvessels of the optic nerve and retina, and refers in this paper to some characteristics of the circulation in these parts, which are of great practical importance in relation to clinical diagnosis. Leber states that the optic nerve along its whole course in the orbit, from the optic foramen to the eye, receives branches from the vessels in its neighborhood; these vessels form a continuous network the whole length of both sheaths of the nerve; the vessels of the two sheaths communicate with each other; and from the network of the inner sheath numerous branches extend into the interior of the nerve, running within the con-

* Second semi-annual Report.

† Ueber das Blutgefäss System des Auges. Zehender's Monatsbl., 1864, Arch. f. Ophthal., xi. 1, 1865.

nective-tissue septa which enclose the bundles of nerve fibres. At the optic foramen, the vessels of the inner sheath anastomose with those which belong to the intra-cranial portion of the nerve. Leber cites a passage from Zinn, published so long ago as 1780, which shows that the anatomical disposition of the vessels just described was familiar to him at that time; Hyrtl, also, in 1839, described arterial branches joining the optic nerve during its intra-orbital course.

From the optic foramen to the point at which the central vessels of the retina enter the opticus, its vascular supply comes wholly from the vessels of its sheath; but as soon as the central vessels enter the nerve trunks they also give off branches to take part in the nutrition of the nerve. The lamina cribrosa, papilla, and the immediately surrounding portion of the retina are supplied with branches both from the central vessels and the ciliary vessels; the branches from the latter are derived partly from the arterial circle in the sclera around the nerve, partly from the choroid. Both sets of vessels take part in the formation of a capillary meshwork, and to this meshwork is due the rosy tint of the papilla observed in health. Wolfring confirms Leber's account of the vessels of the papilla and lamina cribrosa, except so far as the branches from the choroid are concerned; of these he makes no mention.

It is evident that such a derivation of the vessels of the papilla as that here given allows but a very indirect communication between them and the vessels of the meninges and brain, and no very accurate deductions as to the condition of the cerebral circulation can be drawn from the amount of vascularization existing in the papilla.

Very different from this account of the circulation in the optic disc is that which was put forth by Galezowski.* He derived the vessels which supply the trunk of the nerve and the papilla directly from the vessels of the arachnoid and brain, and considered them independent of the retinal vessels. According to this anatomical arrangement, the vascularity of the disc was regarded as representing a cerebral vascularity, and certain clinical observations were thus explained. Clifford Allbutt, in his generally admirable work,† adopts Galezowski's views on this point, and states that he has, by his own observation, satisfied himself that Galezowski is mainly right, and that they bear closely upon the phenomena of morbid change as seen by the ophthalmoscope. At the same time, he accepts, in a foot-note, the "connection between the vessels of the nerve, of the retina, of the chorio-capillaris, and of the ciliary systems," as given by Leber. How he is able to harmonize the two views, so widely different, and, admitting the existence in the papilla of a network of branches from the "central" and ciliary vessels, still to regard the blood supply of the disc as coming directly from the brain along the nerve sheath and thus furnishing evidence of the state of the intra-cranial circulation, it is difficult to comprehend.

Wolfring's attempts to demonstrate the existence of lymph-vessels in the nerve and lamina cribrosa by means of injections into the space beneath the dura mater, or that between the two sheaths of the nerve, failed entirely, even though very considerable pressure was made, and

* Sur l'Existence de vaisseaux capillaires, d'origine cérébrale, dans la papille du nerf optique. Gaz. Hebdom., No. 51, 1865.

† On the Use of the Ophthalmoscope in Diseases of the Nervous System and of the Kidneys. London. 1871.

injections through a canula thrust into the substance of the nerve gave, also, only a negative result. When, however, the canula was thrust simply beneath the inner sheath, the spaces around the bundles of nerve fibres in the trunk of the nerve and similar spaces in the lamina cribrosa were filled by the injected mass. In sections made on nerves thus injected, the spaces filled appeared as an anastomosing network of canals, communicating with a similar network at the inner surface of the inner sheath, from which pretty large branches passed outward to the lymph-space between the sheaths. These canals seemed to be entirely distinct from the network of bloodvessels in the nerve, inasmuch as they were situated immediately around the nerve-bundles, while the bloodvessels, though having the same general distribution, lay in the interior of the septa between the bundles and thus were separated from the lymph-vessels by a pretty thick layer of connective tissue. The endeavor to inject both blood and lymph-vessels in the same nerve failed. Wolfring describes, also, on sections of nerves previously hardened and colored with carmine, numerous lymphoid corpuscles, situated partly in the connective-tissue septa enclosing the nerve-bundles, partly within the bundles themselves. Farther on, he states that in injected preparations, these corpuscles were seen, not only in the injected lymph-canals, but also in the tissue outside of them, as well as among the enclosed nerve fibres. Leber, in his paper, refers to this point, and suggests the probability that these so-called lymphoid corpuscles are really the connective-tissue cells formerly described by him.* A comparison of the plate given by Wolfring to show the corpuscles with a section of the optic nerve under the microscope, and with the drawing given by Leber (loc. cit.), renders the almost identity in position of the corpuscles and Leber's connective-tissue cells incontrovertible, while the much greater accuracy of the latter's illustration is manifest.

Schwalbe's results seem to have differed very considerably from those of Wolfring, though his injections were made in the same manner. The original paper we have as yet been unable to obtain, but give the following abstract of it from the *Monatsbl. f. Augenheilk.*, Jan., 1873. The author tied the trunk of the opticus and thrust a fine canula beneath the inner sheath, between the point of ligature and the globe, and injected through this oil of turpentine colored with alkannin, or Prussian blue dissolved in water. After such injection, the peri-vascular canals around the veins and capillaries, which had been described by His, were found injected; in no instance were vessels corresponding to the course of the arteries filled. The injected fluid spread out, also, some four mm., star-like, in the optic fibre layer of the retina. By the method mentioned, the injected substance also pushes in between the vitreous and the limitans, and passes not infrequently into the central canal of the vitreous. Finally, the fluid reaches, through numerous fine openings, the outer surface of the inner sheath, and so enters the inter-vaginal lymph-space, thereby demonstrating the connection of the injected canals with the lymph system. Mention is also made of the fact that, even on quite fresh eyes, the injected fluid is also frequently found in the parts immediately surrounding the nerve, between the retina and the pigment epithelium. It would seem as if the pene-

* Arch. f. Ophthal., xiv. 2.

tration of the fluid into the latter situation might have been owing to some slight rupture of the tissues rather than to the existence of a normal lymph-space, and it is not evident from the abstract whether the author may not have so regarded it. The statements of Schwalbe must have the more weight, since his previous discoveries of lymph-spaces of the eye have been confirmed by so many observers.

The lamina cribrosa, according to Wolfring, is not, as has been hitherto considered, a modification of the tissue of the sclera in the form of a meshwork, through the interstices of which the nerve-fibres pass to the retina. He holds that the scleral tissue passes wholly into the nerve sheaths, leaving a simple opening for the passage of the nerve. The connection between the nerve and the sclera is due to the numerous anastomoses of their respective blood and lymph-vessels, and the connective tissue of the lamina is derived wholly from the perineurium of the nerve and the adventitia of the bloodvessels.

Retina of the Night-Apes.—Max Schultze (*Central-Zeitung*, Dec. 4, 1872) has found fresh evidence in favor of his views regarding the special function of the yellow pigment in the macula lutea, and of the cones in the rod and cone layer, viz., that the yellow pigment, by absorbing the rays from the two ends of the solar spectrum (specially the violet end), renders the light falling upon the percipient elements of this part more achromatic; and that the cones alone and not the rods serve for the perception of color. This he infers from an examination of the retina of the Brazilian night-ape, nyctipithecus felinus.

Schultze reported the result of his examination at the July meeting of the Niederrheinische Gesellschaft für Natur-und Heilkunde in Bonn. In connection with the investigations of the peculiarities of the retinas of night-waking animals which he had previously made, the examination of a night-ape offered special interest. All day-apes possess a macula lutea and fovea centralis, containing cones alone in the percipient layer, as in man; the previous examinations of night-animals made it, however, probable that in the night-apes the cones, and at the same time the macula lutea and fovea centralis, would be wanting.

This supposition proved correct. Nowhere in the fresh retina was there any yellow pigment, nor any cones. The percipient layer consisted entirely of rods, considerably thinner and longer than those of man. This layer had the same structure in the posterior portion of the eye where the visual axis cuts the retina, as in the equatorial regions. Fovea centralis was wanting, as well as macula. The outer granule-layer was of considerable thickness, on account of the numerous layers of rod-granules, as is always the case when there are no cones and the rods are very thin; the outer fibre-layer of Henle, the existence of which depends on that of the macula, was not present. In all parts of the retina there was only a thin single layer of ganglion-cells.

Physiology.

F. C. Donders.—Ueber angeborene und erworbene Association. Graefe's Archiv, xviii. 2.

J. Samelsohn.—Zur Frage von der Innervation der Augenbewegungen. Ditto.

Dr. L. Mandelstamm.—Beitrag zur Lehre von der Lage correspondirender Netzhautpuncte. Ditto.

Whether the association of movement of the muscles of the two eyes is congenital, i. e., dependent on anatomical arrangement, or acquired by the individual, has been the subject of much discussion. Helmholtz on the one side, and Hering on the other, have been the leading opponents in the controversy. The former maintains the acquired nature, the latter the anatomical source, and, therefore, necessity of the phenomenon; each, however, admits certain modifications of his theory. Adamük, from the result of experiments on dogs and cats, in which different portions of the corpora quadrigemina of either side were stimulated by an electrical current, concluded that the connection between the movements of the two eyes is due to a mechanism arranged to this end, and ranges himself, therefore, on the side of Hering.

Donders does not wholly agree with either of the above views, but takes a middle ground. He considers that the production of convergent squint in hypermetropia must be regarded as a proof that the independence of convergence and accommodation is congenital. On the other hand, the so-called relative accommodation and the changed relation between convergence and accommodation which exists in myopia and hypermetropia show that the interdependence is not absolute, but may be modified by practice. The modification is, then, acquired. Donders is a firm upholder of the development theory; in his view, both what is congenital and what is acquired is the same in nature; the congenital is the result of practice in former generations, the acquired of practice in the individual; each must have an anatomical basis. The effect of practice is to modify the anatomical structure. Has the practice of former generations been uniform in any particular, so will the practice of the individual be of less avail in overcoming it. In the lateral movements of the eyes, a certain amount of independence has always been necessary, and accordingly the individual may vary the relation between the action of the lateral muscles considerably; but with the vertical movements it is different, the practice has been pretty uniform, and the individual can do but little against the weight of inheritance. The experiments of Adamük show only that certain groups of cells call forth corresponding contraction in the muscles of both eyes; the will, by which the action of these cells could be modified, and the organizing influence of which on the cells is far different from that of an electrical current, had no part in the production of the phenomena observed.

Samelsohn discusses a case of oculo-motor paralysis of one side, in which the varying relations in the action of the muscles of the two eyes during gradual recovery from the paralysis were carefully observed, and showed a marked degree of independence. His conclusion, from study of this and other cases is, that the centres of movement of the two eyes are separate, and act together only in the interest of single vision; so soon as the conditions for this are changed, independent action can, under certain circumstances, occur.

Mandelstamm concludes, as the result of experiment, that the so-called identity of corresponding points in the retinas of the two eyes is not based on a preformed anatomical arrangement, but acquired through experience. In agreement with the fact that we habitually pay more attention to objects situated below us than to such as are to one side, and comparatively seldom observe objects above us, the har-

monious correspondence of the two retinas was found to be greatest in the upper, less in the lateral, and least in the lower portions.

Influence of Lenses on Vision.—Donders, besides the paper which has been noticed above, contributes another to the same journal on the influence of lenses on the sharpness of vision. It would demand more space than the limits of this report will allow to attempt to give his reasoning in any detail. He shows that, while the influence which a particular lens exerts on the sharpness of vision of an eye of given refractive power may be found by calculation, it is an absurdity to undertake to show by calculation what the normal sharpness of vision should be in the various degrees of ametropia.

Color Perception.—Schirmer gives, in the *Berl. Klin. Wochen.*, Feb. 3, 1873, the result of investigations on the perception of different colors. He found that for each pigment-color there is a special district around the fixation point in which it is correctly made out. These different districts are bounded by irregular horizontal ovals, and extend farther toward the temple than inward. The district in which green is perceived as such is the smallest; then come red, purple, violet and orange, while yellow and blue are distinguished still farther toward the periphery. Around the green "field" is a pretty broad zone, in which green appears yellow; around the red field a narrower zone in which it appears yellow; around the purple and violet fields are zones in which these colors are seen as blue; outside of the zones the various colors appear bright or gray on the dark background. Yellow and blue are made out beyond all these zones (blue farthest), and they alone retain their color so long as they are visible. The size of the color-fields and zones is only relative, and must be measured with retinal images of equal size; if larger retinal images are obtained, the size of the fields and zones is greater. Schirmer concludes, therefore, that blue and yellow are the chief color sensations; the greatest energy for color-perception is required for green, then for red, &c.; *a priori* reasoning from the above facts would lead to the supposition that, with the progressive decrease of perception of color in atrophy of the optic nerve and retina, the different fields and zones in which the various colors are distinguished must, in equal degree, gradually contract, till they finally disappeared in regular order. This, Schirmer found to be the case. Green disappears first, then red, but both are still perceived over a small field as yellow; the other colors follow the same rule; yellow and blue are known longest, and, finally, before all color perception is gone, blue alone is made out close to the fixation point.

Passage de Venus sur le Soleil is the title of an interesting paper by Giraud-Teulon in the *Annales d'Oculistique*, July and August, 1872. The occasion of the article was the publication of a paper read before the Association Scientifique de France, by M. Wolf, of the Observatory of Paris, in which he endeavors to explain the cause of the difficulties astronomers have met with in determining the exact instant of contact of the borders of the planet and the sun. This difficulty has been caused by the appearance between the borders of the two bodies, at the moment they have approached very near to each other, of a spot known as the "*ligament noir.*" It has not been seen, however, by all observers. M. Wolf considered the production of this disturbing appearance due to aberration of sphericity in the lenses employed.

Teulon, however, convinced himself that spherical aberration cannot produce, though it may increase the phenomenon; the true cause is to be sought in some defect of the refractive condition of the observer's eye; with the correction of this the difficulty would disappear. He points out the ignorance shown by M. Wolf of the advances in physiological optics during the last two decades, and ends with a lament that in this important branch of science France stands at least fifteen years behind her neighbors.

Physiological Import of Iridectomy.—Exmer (*Wiener med. Zeitung*, No. 21, 1872) brings forward a new theory as to the cause of the decrease of intra-ocular pressure produced by iridectomy. He performed the operation on rabbits and found that the division of the arteries of the circulus arteriosus iridis major gave rise to the formation of considerable anastomoses, and it appeared that in this way the pressure of the blood in the vessels was diminished. This formation of anastomoses and consequent decrease of intra-vascular pressure, he believes, explains the lessened tension of the globe found after iridectomy, since Donders has shown that the intra-ocular pressure tends to regulate itself by preserving the balance between the intra-ocular fluid and the fluid in the bloodvessels.

(To be concluded.)

Rupture of the Axillary Artery in an attempt to Reduce a Dislocation of the Shoulder.—This unusual accident is reported by Prof. Joseph Lister, and happened in the case of a man 58 years of age, who, eight weeks previously, had met with a fall, producing an ordinary subcoracoid luxation of the humerus. In the course of a somewhat prolonged attempt at reduction (under chloroform), the limb was raised forcibly upward, in order to obtain the leverage afforded by having the acromion as a fulcrum, at which juncture a snap was heard as if of something giving way. Shortly afterward, efforts at extension having in the meanwhile been kept up, an enormous swelling suddenly appeared below and behind the axilla, almost as large as an adult human head, evidently due to a sudden extravasation of blood. Prof. Lister now lost no time in having the patient placed upon the table, when he proceeded to cut down upon the injured artery, exposing the seat of the orifice. The artery was then tied, both above and below this orifice, and the head of the humerus removed so as to permit reduction into the glenoid cavity. Death ensued three hours after the conclusion of the operation.

The results of the *post-mortem* examination were sufficient to explain the accident. In the first place, the walls of the vessel had been weakened by atheromatous degeneration, which was present to a marked degree. Secondly, the head of the humerus was found to be partly surrounded by a mass of osteo-fibrous tissue, forming bands and spiculæ, designed by nature to form a partial capsule for the new joint, but which had become intimately connected with the axillary artery, so as to firmly attach that vessel to the humerus and also the coracoid process. Violent traction having been applied to the artery between these two points, the weakened vessel naturally enough gave way.—*Edinburgh Medical Journal*, March, 1873.

Reports of Medical Societies.

BOSTON SOCIETY FOR MEDICAL IMPROVEMENT. F. B. GREENOUGH, M.D., SEC.

JAN. 13th.—*Lithotomy.*—Case reported, and the stone exhibited, by Dr. CABOT.

The patient, a carpenter, 30 years of age, was born in England, and had been in this country and city for about three years. For ten years, at least, he had been subject to a burning, stinging sensation in the glans penis at the end of micturition, and occasionally at other times, but there had been no other local symptoms, and otherwise his health was good.

Nine months ago, he fell asleep in the evening, and whilst heated, near an open door, and slept for over an hour. That same evening, he passed from the bladder, and without pain, from one to two gills of fresh blood, and two days afterwards about as much more. After this attack he became much worse, and his sufferings progressively increased. The pain was very much increased by riding in any kind of a jolting vehicle, but not by walking, and often came on suddenly while he was at work, so that he was obliged to stop at once. Urine passed more frequently, and, for about three weeks after the hæmaturia, as often as every ten or fifteen minutes; with much sediment, and sometimes being suddenly stopped by the pain. Last June, and for about two months, he had pain in the perineum, but at no other time.

Three weeks before his admission into the hospital, something seemed to give way, and he passed a "gritty matter," which he had never before observed. This was followed, for about eight or ten days, by a puriform discharge, and with it a small clot of blood about the size of a pea. For some days he was obliged to pass his water every few minutes, but on admission he could retain it for an hour and a half; micturition being sometimes accompanied by a small and involuntary discharge of fæcal matter.

Meanwhile his health was pretty good, and he had worked until the last three weeks; but he had lost flesh, and his appetite was rather poor.

Nov. 21st, 1872, he entered the Massachusetts General Hospital, and gave, essentially, the above report of his case. His general appearance is that of an intelligent and temperate man, and though his figure is small, he looks, at least, sufficiently healthy. The urine was quite albuminous, and there was a heavy sediment, with pus corpuscles.

On the 23d, Dr. Cabot attempted to crush the stone, but finding it impossible, he removed it by the usual lateral operation. The wound was then closed with a sponge, after the introduction of a catheter, and a water-dressing was applied.

On the 24th, the man was doing well, and the sponge was removed; on the 25th, the catheter was removed, and, on the 28th, oxide of zinc and starch was substituted for the water-dressing, on account of an eczema that had appeared. Dec. 2d, some of the urine came through the penis, and on the 5th he reported that it all passed that way during the day, though a little leaked through the incision at night. Eczema nearly gone. This was the last record of any discharge through

the perineum, and, on the 5th of January, he left the hospital, with the wound very nearly healed; the relief to his sufferings having been complete since the time of the operation.

The calculus, which weighed, a few days after removal, one ounce and five grains troy, is of the form of a flattened sphere, about one inch and one-third in diameter and about two thirds of an inch in thickness. External surface presented prominences which were very marked, from about one to four or five lines in diameter, regularly rounded, and without any appearance of that aggregation of little granules of which they are so often made up in the mulberry calculus. Surface encrusted with an opaque, dirty-white deposit, about the thickness of blotting paper; and this having been broken off in some parts, probably in the removal of the stone, the dark structure beneath is exposed. The calculus having been sawed, one-half has been polished, and the appearances that it presents are very unusual and beautiful. The outer half is imperfectly but very decidedly lobulated; the rounded termination of the lobules forming the prominences upon the surface, and being gradually lost towards the centre of the stone. The structure, as a whole, is hard and compact, and the cortical portion of the lobules, as it may be called, is particularly so. On close examination, these last are seen to be finely laminated, and the laminæ are traversed by other lines that are less distinct, and that run from the central portion towards the circumference. The cortical portion of the lobules is of a rich, though not intensely, dark-brown color. The color of the central portion, which constitutes a small part of the whole lobule, is much lighter, and in some of them is quite imperfectly developed. The thin concentric, or parallel laminæ, however, are very distinctly continued in several of them, though the intervening substance is not completely filled in. The remainder of the calculus is of a brownish color, varying in depth, but nowhere so dark as the cortical portion of the lobules. In structure, it has a somewhat nodular or coarsely granular appearance, and suggests the idea of a section of the knotted root of a tree; and this extends up towards and more or less into the central portion of several of the lobules. In the very centre of the stone is a nucleus, about two by four lines in diameter, but this is scarcely visible upon the polished half of the calculus, but perfectly marked upon the other.

The chemical analysis of this specimen, as determined by Dr. Edward S. Wood, Professor of Chemistry in the medical school, is as follows. Nucleus; uric acid, with considerable phosphate of lime and triple phosphate. Central portion; principally oxalate of lime with some phosphate of lime and triple phosphate. External crust; principally phosphate of lime; a little oxalate of lime and triple phosphate.

Second Case of Lithotomy.—Dr. Cabot also showed a calculus that he removed from a little boy, 7 years old, in the year 1862. The patient entered the Hospital Sept. 22d, with phymosis, and complaining only of a dribbling away of the urine. On the 23d, he was circumcised, and as there was some suspicion of a stone, the sound was passed and one was felt. The operation was at once performed, and he did perfectly well from that time, except the phymosis, which subsequently required and was relieved by an incision. Sept. 27th, the urine passed wholly by the penis. Oct. 5th, the wound in the perineum had nearly closed, and on the 18th of November he left the hospital.

The calculus is of an irregular and somewhat conical form, one inch in length, and about one inch and one-third in diameter. Not analyzed, but looks, from the exposure of the nucleus, as if it may be a uric acid calculus, with a phosphatic coating about it. Both calculi are in the Cabinet of the Society for Medical Improvement.

JAN. 13th.—*Melanotic Liver.*—Case reported by Dr. LYMAN.

C. A., Swede, æt. 40, blacksmith, entered City Hospital Dec. 15th, 1872. Parents died of old age. His general health has, until recently, been good. Three years ago, had tumor in left eye, for which the organ was removed by Dr. Derby.

Two months since, he fell while carrying a heavy weight. This was followed by pain in right hypochondrium, which has continued, but gradually increasing in severity.

Five weeks since, first noticed swelling in region of liver. Liver now extends across abdomen from crest of right ilium an inch above anterior superior spinous process, obliquely across through a point an inch below umbilicus. The lower edge sharp and well defined, like lower ribs. Has recently had piles, and some hæmorrhage; no ascites or anasarca. Urine contains abundance of bile; nothing else abnormal. Appetite poor and food distresses. Bowels move daily. Pulse 72. Temperature 99½°.

25th.—Somewhat jaundiced; some ascites; a thin layer of fluid between abdominal wall and liver.

30th.—Pain continues severe, especially at night.

Jan. 5th.—Had chill in the night, sweating profusely in morning; deeply jaundiced.

8th.—Had frequent attacks of epistaxis and hæmatemesis the past two weeks.

10th.—Sleeps most of the time, induced by morphine, taken for the constant epigastric pain and occasional coffee ground vomiting.

12th.—Groaning in his sleep, and delirious.

13th.—Death.

Autopsy by Dr. Webber.—(Left eye wanting.) Brain.—Over vertex, pia mater much more thickened than normal, and œdematous. The centre of greatest change rather posterior to vertex, and the change extended anteriorly, laterally and posteriorly over both hemispheres, following course of vessels. Substance of brain healthy. Left optic nerve about one half the size of the right, translucent, and contained a very small portion of normal nerve fibres, perhaps not more than one per cent.

Seen under microscope, showed round and fusiform cells, with large nuclei; fibrous stroma was in places arranged in tolerably regular alveolar net work, in other places very irregular, twisted together; many round, fusiform cells pigmented.

Both lungs seemed healthy, except small spots of extravasated blood under the pleura, and a few spots, possibly hæmorrhagic, in lung substance. There were one or two masses of pigmented tissue, which may have been of the same character with the liver growth; seen by gas-light, they seemed to be such.

Heart healthy. On anterior surface of mediastinum, two or three enlarged and dark-colored glands.

Liver weighed fourteen pounds three ounces. It was filled with melanotic sarcoma. Its surface nearly smooth, only slightly nodulated. Part of disease very strongly pigmented. Glands of neighborhood enlarged and somewhat pigmented.

Stomach.—Mucous membrane black in several spots, in size from one-fourth to three-fourths of an inch in diameter; at which points, tissue seemed thickened, but no nodules.

Spleen, kidneys, and intestines, so far as examined, healthy.

Dr. JACKSON said that he had never seen so large a liver. The form of the disease was also peculiar, the whole of the liver appearing to be more or less affected. Inasmuch as melanosis is usually so generally distributed throughout the organs, it is strange that, in this case, the disease should be confined to the liver. He spoke of a woman who had had an eye removed for melanotic disease, and lived eight years. After death, melanotic deposits were found in almost every organ.

Dr. FITZ also thought it strange that the other organs were not diseased in this case. He referred to a case where the disease had extended from the eye backwards to the brain. The fact of the liver containing considerable pigment, in its normal condition, may account for its liability to melanotic disease, as is the case also with the choroid. The fact of a tumor being melanotic does not necessarily show that it is malignant, as all new formations may contain pigment cells.

JAN. 27th.—*Purulent Pericarditis and Parenchymatous Nephritis.*—Dr. MINOT reported the case.

The patient was a young Englishman, 24 years old, of good habits, a groom in a gentleman's family. Without any known cause, he began to complain of not feeling well, but without definite symptoms, about Jan. 15th. He had some pain in the chest on the 17th, but on the 18th and 19th he was up and dressed, and apparently nearly well. At 1 o'clock on the morning of the 20th, he was awakened by a rigor, which was immediately followed by agonizing pain in the *right* side of the chest, requiring repeated subcutaneous injections of morphia to render it endurable. The pulse, which at first was only 84 in the minute, soon became rapid, and remained at about 144 as long as the patient lived. There were no physical signs noticed which would indicate disease within the chest. No deficiency of respiratory murmur anywhere, no dulness, no râles, no cardiac murmur, or friction sound. The heart, however, was not particularly examined, as no disease in that organ was suspected. In the course of the day, the pain shifted to the epigastrium, where it remained. Considerable tenderness was found just below the xiphoid cartilage, and the diaphragm scarcely moved during respiration; it was, therefore, conjectured that the disease was peritonitis, possibly caused by perforation of the stomach or intestine. On the other hand, there was no tenderness in any other part of the abdomen, no meteorism, no vomiting, no constipation. On the morning of the 21st, the patient was pulseless, the skin was mottled, the extremities livid, and he died at noon, having had, an hour previously, a natural and spontaneous movement of the bowels. The mind was clear throughout. There was no dyspnœa at any time, and no pain referred to the region of the heart.

The *autopsy* was made twenty-six hours after death, by Dr. FITZ, who furnished the following report:—

Pericardium contained about twelve ounces of purulent fluid, with but few fibrinous flocculi. The visceral and parietal layer of the pericardium thickened slightly, roughened, opaque, rather velvety than shaggy or villous. Near the apex of the left ventricle, posteriorly, a small amount of yellow fibrine of gelatinous consistency, was mode-

rately adherent. The heart substance firm, but pale. The valves and cavities apparently normal.

Lungs emphysematous from *post-mortem* decomposition. Spleen small, pale, grayish-red, soft, not grumous.

Kidneys rather small, flaccid, of a uniform reddish tint, probably from decomposition. Capsule readily detached. On section, a somewhat greasy lustre, the region of the convoluted tubes opaque, dirty white, irregularly minutely beaded. Under the microscope, the convoluted tubules contained a minutely granular mass, completely obscuring the nuclei. Acetic acid made the tubes somewhat clearer by dissolving a limited number of the granules.

At the anterior portion of the longitudinal fissure of the liver, bridges of recent fibrinous coagula extended across between the two lobes. Recent adhesions were also found throughout the longitudinal fissure, quite abundant in the immediate vicinity of the inferior cava, as it perforated the diaphragm, and on the upper surface of the liver in the immediate vicinity.

The intestinal canal presented no abnormal appearances.

Diagnosis.—Purulent pericarditis and parenchymatous nephritis.

Dr. FITZ showed the heart from a case of death unconnected with cardiac disturbance.

Old fibrous adhesions were seen between the left ventricle and the opposed parietal pericardium, corresponding in position with the recent adhesions seen in Dr. Minot's case. As a result of these, apparently, considerable hypertrophy of the left ventricle had taken place, the condition of the heart and other organs not permitting any other explanation of the increased thickness of the ventricular wall.

JAN. 27th.—*Croup; Tracheotomy; Recovery.*—Dr. SWAN reported the case and showed the specimens.

H. L., æt. 4 years and eight months, a well-nourished, healthy-looking boy, had symptoms of spasmodic croup on the 5th inst. He had already had four entirely distinct attacks, the first having occurred at the age of 17 months, the last in April, 1872, for which I saw him. It terminated in a mild bronchitis of two weeks' duration. The father, when a boy, nearly lost his life by what is supposed to have been membranous croup. The spasmodic attack of the 5th instant had been preceded by a sore throat, with enlarged cervical glands, of ten days' duration, but terminating, apparently entirely, some three weeks before the attack, nothing having marked the interval, except, perhaps, a slightly inferior condition of the general health. The spasms occurred and continued for a while, principally at night, and the days were pretty comfortable. There was some febrile movement the first forty-eight hours, during which the pulse reached, at one time, 120. In about five days, i. e. the 10th inst., the voice was reduced to a husky whisper, phonation being quite exceptional, and, when occurring, very high-pitched and unnatural. The dyspnœa, which had been intermittent and concerned principally with the inspiration, now became constant, though varying in degree, and the expirations were also forced and audible. Deep epigastric depression occurred with every inspiratory act. The cough was dry and painful, and signs of distress were too apparent. On the 11th, the chamber was imperfectly supplied with steam, but on the following day a regular and abundant supply was begun, and this was maintained throughout the principal part of

the treatment. The disease progressed from bad to worse, the greatest dyspnœa being in the night, but the color had continued good till the morning of the 13th inst., about the eighth day from the first attack of dyspnœa. On that morning, there was marked lividity of the hands and face, and the patient lay upon his side, exhausted. While preparations were making for tracheotomy, I was suddenly called, and saw that he had ceased to breathe. Faint pulsations of the heart were still audible to the ear placed upon the chest.

There was neither time nor occasion for ether. The trachea was at once opened, and a double canula inserted. Artificial respiration was begun by blowing directly through the canula, and after five or six inflations the natural breathing began, and in a little while the child was restored to consciousness. A fibrinous cylinder, cylindrical for an inch of its extent, was immediately thrown off through the tube, and this was the first ocular evidence that any such deposit had occurred, the throat having been found perfectly clean whenever examined, although the fauces had a tumid look, with narrowed isthmus. On the following day, another cylinder, similar to the first, though perhaps narrower, was thrown off through the tube, after a struggle which threatened suffocation. At other times, small fragments came away without special effort. The patient went on well after the operation. The secretion of thick, tenacious, semi-purulent mucus, which seems to mark the favorable cases, as distinguished from the watery secretion which spatters out through the tube in the unfavorable ones, continued copious and essentially the same in character throughout, occasioning, at times, not a little trouble to the patient in his spasmodic struggles to get rid of it, and to the attendants whose duty it was to keep the canula clear. The room was kept at a high temperature—76° to 80°—and the steam was allowed to be always perceptibly felt in the room. Moreover, the lowering of the temperature and the withdrawal of the steam were made a gradual process from day to day. On the 18th inst., five days after tracheotomy, the tube was removed, an hour after the administration of an opiate, and there has been no occasion to return it. For some days afterwards, there were occasional laryngeal spasms, generally connected with efforts at expectoration, and these were at times almost alarming; but it has been interesting to watch the gradual return of function to the larynx, the wound in the trachea meanwhile gradually closing, and the strength, appetite and sleep regularly improving. The wound is now (26th) nearly closed, cough and expectoration at minimum, and voice very good.

JAN. 27th.—*Tuphlo-enteritis after a Fall.*—Dr. C. D. HOMANS reported the case.

A little girl, 7 years old, in perfect health, fell a distance of ten or twelve feet while playing; she was carried home and put to bed, and, after a night of considerable suffering, was seen by Dr. Homans on Sunday, the accident having occurred on Saturday afternoon. She had then much pain in the abdomen, mostly on the right side, but was able and desirous to get out of bed. A cathartic had been given, followed by copious stools. She was placed under the influence of opium, but the next day symptoms of peritonitis had developed themselves, and she died on Thursday, the fifth day after the fall. The tenderness was greatest over the right iliac region during the first days, but spread all over the abdomen before death.

An autopsy was made, twenty hours after death, by Dr. Fitz, with the following result:—

No rigor mortis. Abdomen swollen and tympanitic.

Head not opened. Thoracic cavity presented no abnormal appearances.

Spleen anæmic, of normal size. Kidneys not remarkable. Peritoneal surface of liver presented evidences of recent inflammation. Intestines everywhere united by fibrinous adhesions, easily torn apart. The great omentum spread over and attached to the intestines lying beneath.

A small amount of purulent fluid lying between the intestines, encapsuled by the adhesions. The peritoneal surface in general reddened, covered with false membrane. But little free effusion in the abdominal cavity.

The vermiform appendage bound to the walls of the right iliac fossa posteriorly by recent adhesions.

Perforation had occurred at the lower third, through which a semi-solid fæcal concretion, as large as a bean, had escaped, and was found in the immediate vicinity.

The mucous membrane of the lower third of the appendage was swollen, injected and roughened from recent inflammation.

Dr. Homans said he had reported to the Society a similar case in June, 1867, which was published in the Extracts from the Records; in both cases, the subjects were little girls, and the deaths seemed to depend upon the falls, which had probably caused the inflammatory action to be set up about the appendix.

The Origin of Bacteria.—A correspondent sends us the following:

"When Dr. Bastian, in his much-talked-of book on *The Beginnings of Life*, stated that bacteria appear in hermetically-sealed flasks containing turnip-infusion with a morsel of cheese, the whole of which had been raised to a temperature generally believed to be sufficient to destroy bacteria, there were, and perhaps there still may be, many unbelievers. Similar experiments have been made by others, and the results have been negative. It is a relief to find that at length some competent person has asked Dr. Bastian to demonstrate the truth of his statements. We could scarcely have desired a more efficient witness than Dr. Burdon-Sanderson; and the testimony which he bears to the truth of Dr. Bastian's work is the more striking, because, as he avows, he himself doubted the accuracy of Dr. Bastian's 'statements of facts.' An account of these experiments is given by Dr. Sanderson in *Nature* (vol. vii., No. 167).

"In conclusion, Dr. Sanderson states that he has 'established, at all events to his own satisfaction, that, by following Dr. Bastian's directions, infusions can be prepared which are not deprived, by an ebullition of from five to ten minutes, of the faculty of undergoing those chemical changes which are characterized by the presence of swarms of bacteria; and that the development of these organisms can proceed with the greatest activity in hermetically sealed vessels, from which almost the whole of the air has been expelled by boiling.' It seems to us that we are now simply shut up to one of two statements. Either bacteria, under certain conditions, are generated *de novo* in organic fluids, or the germs of bacteria are not killed by exposure for ten minutes to the temperature of boiling water."

Bibliographical Notices.

American Chemist. A Monthly Journal of Theoretical, Analytical and Technical Chemistry. Philadelphia. 1873. Vol. III. No. 8.

THE February number received contains the usual number of well-selected original communications and translations on analytical and theoretical chemistry. This journal, which has only reached its thirty-second number, is the only purely chemical journal of any note in this country, and supplies the want which had so long been felt, of a medium through which our American chemists could impart the results of their investigations, especially in technical chemistry, to each other. In respect to this branch of the science, it compares favorably with any of the foreign journals, the larger number of the articles being devoted to improvements in the various branches of applied chemistry. With subjects relating to physiological or medical chemistry it has little to do.

In the last part of each number is a very complete summary of the contents of most of the English, French and German chemical journals, which adds greatly to its value as a journal for reference. E.S.W.

Transactions of the Obstetrical Society of London. Vol. XIV. 1872. London: Longmans, Green & Co. 1873. Pp. 387.

THE published transactions of the Obstetrical Society of London contain some of the very best work and thought of the most distinguished living obstetricians. The present volume is fully up to the standard reached by those of former years. Among many interesting cases are a few which seem to deserve special mention.

Fibro-cystic disease of the Uterus and both Ovaries. Extirpation of the whole. Recovery.—The case was supposed to be ovarian, until a long incision over the tumor had been made, when the operator (Dr. Thomas Bryant, Guy's Hospital) at once recognized the nature of the growth. There were no adhesions. The broad ligaments were secured separately, and the uterus at its neck ligatured in halves. A good strong clamp was also put in, and the tumor excised. No bleeding followed. The wound was brought together, and a morphia suppository given. Everything went on well. The sutures were removed the fourth day. The clamp dropped off the fourteenth. In another week, the parts had united. At the end of the fourth week, she was up and about. The tumor weighed eight and one-half pounds.

Cæsarean Section in 1866. *Subsequent Pregnancy, and Delivery per vias naturales. Recovery.*—In the Obstetrical Transactions, vol. viii., 1867, the operator, Dr. William Newman, reported a case in which, owing to what was then supposed to be epithelial disease of the lower part of the uterus, the operation of Cæsarean section was performed (July 23, 1866), and a child (six and a half to seven months) removed. The mother made a good recovery. January 2, 1872, she entered the Stamford Infirmary, and Dr. Newman delivered her with forceps, July 11, of a living male child at the full term of utero-gestation. The patient subsequently made a good recovery.

Long delay of Labor after the Discharge of the Liquor Amnii.—Dr.

J. M. Duncan gives the details of a case in which there was a partial discharge of the water for forty-five days before labor set in. He also briefly alluded to many other similar cases on record, and advanced the opinion that, as a rule, the delay following the discharge of the *liquor amnii* is only until the evacuation is complete; many of the cases reported being those in which a portion only of the waters escaped. In some, the almost constant dribbling away of the *liquor amnii* is occasioned by a constant new secretion of the same.

Many other interesting cases are reported by members of the Society, and in addition to these the volume contains an unusually large number of papers on subjects connected with the theory and practice of obstetrics.

Dr. J. Braxton Hicks contributes one of the most important papers, his subject being the "Anatomy of the Human Placenta." In it Dr. Hicks divides all the authors who have written on this subject into two classes: those who favor the Hunterian or sinus-system theory, and those who oppose it, amongst which latter class the writer places himself. The paper is most carefully written, and the illustrations are numerous and serve to render the descriptions of the placental sections unusually clear.

Dr. J. H. Aveling gives an analysis of forty-four cases of "*post-mortem* parturition." An extract from this valuable paper has already appeared in this JOURNAL (Feb. 13, 1873).

Dr. Charles E. Squarey contributes an article on the "Causation of acquired Flexions of the Uterus, and their Pathology." In it he endeavors to explain why in two cases, the same causes and conditions apparently existing, an anteflexion is found in the one and a retroflexion in the other. By a careful examination of the normal position of the uterus, and the usual causes of flexions, Dr. Squarey thinks "that when an anteflexion is produced the uterus is, at the time that the cause comes into action, situated high up in the pelvis, occupying its normal position, the axis being forwards, so that any force striking it from above would impinge on the posterior and upper surface of the fundus, and so force it forward and produce anteflexion; that when retroflexion is produced, the uterus has sunk more or less deeply in the pelvis, with the axis directed more or less backward, and in this curve any force striking it from above would impinge on the anterior and upper surface of the fundus, and so force it backwards and produce retroflexion."

Alluding to those cases where the uterus remains in a flexed condition, although no inflammatory adhesions have had time to form, the writer thinks that the flexion is maintained by a loss of tone of the uterine tissue, a loss of tone which, in traumatic cases, is due to some rupture of the uterine tissues. This rupture eventually heals, but in such a way as to maintain the existence of the flexion, and even, in some cases where a contraction of this newly-formed tissue takes place, to cause the flexion to become still more marked.

Dr. F. W. Lowndes presents a paper, showing great research and care in its preparation, on the "Statistics of Stillbirths." In it are brought together a large number of statistics on the subject from those countries in which a systematic registration obtains, and to these are added the figures reported by various writers on obstetrics and those obtained from the various lying-in hospitals in Europe. One fact is

clearly proved by the paper, namely, that, with few exceptions, the percentage of stillbirths is the lowest where the number of forceps cases is the highest; a statement which Dr. Playfair, at the close of the reading of the paper, still further emphasized by alluding to the remarkable results related by Dr. Hamilton (Falkirk), who was accustomed to use the forceps in about the ratio of one to every seven or eight labors, and who has obtained the unprecedented result of 731 consective labors without a single stillbirth.

Dr. Robert Barnes, in a most excellent article on the "Essential Cause of Dysmenorrhœa," claims that, with very rare exceptions, the one essential condition of dysmenorrhœa is retention of the menstrual secretion. He divides all cases into two classes: 1st, those in which the symptoms are caused by an incomplete closure of some portion of the genital canal. This closure may occur anywhere between the fimbriated extremity of the Fallopian tubes and the vulva. 2d, where there is congestion of the uterus combined with extreme nervous susceptibility. In both these cases there is retention; in the first class, the blood being retained in the cavity of the uterus after secretion, while in the second it is retained in the uterine tissues. Several interesting cases are given to prove the truth of this theory.

Many other papers are given, relating to various subjects in which the members of the Society are especially interested. A brief account of the discussions which followed the reading of the papers is also given, thus presenting in one volume the various opinions held by eminent practitioners at the present day. R.

BOOKS AND PAMPHLETS RECEIVED.

Defence of Insanity in Criminal Cases. Argument of Henry L. Clinton, delivered April 15, 1873, at Albany, before the Judiciary Committee of the Senate. New York. 1873. Pp. 41.

The Passions in their Relations to Health and Diseases. Translated from the French of Dr. X. Bourgeois, by Howard F. Damon, A.M. M.D. Boston: James Campbell. 1873. Pp. 201. (From the Publisher.)

Archives of Ophthalmology and Otology. Edited by Prof. H. Knapp, M.D., of New York, and Prof. S. Moos, M.D., of Heidelburg. New York: Wm. Wood & Co. 1873. Pp. 260.

Annual Report of the New England Hospital for Women and Children, for the Year ending Sept. 30, 1872. Boston. 1873. Pp. 33.

Change in the Color of the Hair and Skin.—Dr. H. V. Ferrell (*The Clinic*, April 7, 1873) relates a case of rapid change in the color of the hair and skin of a boy aged 11 years. Several months ago, the boy was considerably frightened by being run away with, soon after which the change of color began to be noticed. At present, at least, three-fourths of the hairs of his head are perfectly white, while the scalp, forehead, cheeks, temples and sides and back of the neck are as white as snow. The white hairs present a uniform appearance throughout their entire length, whereas those that retain their natural color (auburn) show no change in any part of their course.

Boston Medical and Surgical Journal.

Boston: Thursday, May 1, 1873.

RE-APPEARANCE OF THE CHARLESTON MEDICAL JOURNAL.

We congratulate, heartily, our medical brethren of the South upon the re-establishment of this periodical, which formerly took so high a rank among our scientific journals.

The medical profession of South Carolina numbers many men of superior ability and high culture, and it must conduce greatly to the advancement of medical science, if this, the representative journal of the State, receives from them a cordial support. If its pages can be kept up to the standard of the opening number, which is in every respect a creditable production, we are confident that its own intrinsic merit cannot fail to insure from other States a liberal patronage.

Morocco Drugs.—The *British Med. Journal*, Feb. 8, 1873, reports that, at a recent meeting of the Pharmaceutical Society of Great Britain, Dr. Arthur Leared gave some interesting information respecting drugs collected in Morocco during a recent visit to that country. Although the Science of Medicine owes much to the Arab race, which is well represented in Morocco, Dr. Leared found the difficulties besetting an inquirer to be very great, in consequence of the ignorance and fanaticism of those who now practise the strange jumble of astrology and pharmacy which there passes for the healing art. The vegetable products of Morocco, Dr. Leared states, are those of a subtropical country, in which there is great variety as regards the nature of the soil, elevation above the sea-level, and irrigation, great diversity of climate and soil being sometimes experienced within narrow limits. One circumstance that struck him forcibly was the peculiar sporadic distribution of plants, since it almost seemed as if they, like the people of the country, were possessed of exclusive tendencies which prevented one kind from mixing with another. As might be expected, many of the drugs proved to be old friends with new names, among which may be mentioned caraway, anise and fennel seed, ammoniacum and euphorbium gums, rue, cassia, Indian hemp, castor and croton oils, orris root, ambergris, &c. A certain amount of interest attaches to the identification of our own remedies among the Moors, and Dr. Leared is not without hope that some addition to our materia medica may result from the present inquiry. Out of about sixty articles mentioned, he reckons that one-half are well known and commonly used by ourselves, or else derived from botanical sources so closely allied as to be practically the same. About one-fourth are known to but not used by us; and the remainder are derived from plants not at all in use here, or not yet identified. One point worthy of notice is that, while a great number of natural orders are represented, there is a great preponderance of the labiate order.

Hypodermic Injection of Ergotin in Internal Hæmorrhages.—The *Medical Times and Gazette*, Nov. 16, 1872, contains an account of the observations of Dr. Drasche, of Vienna, on this subject. Mention is first made of the influence of such injections, as observed in two persons in robust health. Each injection was followed by a diminution in the number of the pulse by from four to six beats, and the sphygmographic markings exhibited a simultaneous contraction of the calibre of the vessels. The temperature was slightly increased, and the respiration continued normal. No influence on the secretion of urine was perceptible, and the health was undisturbed.

Most of the cases of disease in which Dr. Drasche has tried this means have been examples of hæmoptysis occurring in the subjects of tubercle. He furnishes abstracts of nine cases. The ergotin was administered in doses of from one grain to one grain and a half; the whole quantity employed in each case varying from one grain to seven grains and a half, and the treatment by it occupying from one to six days. The injection, in all cases, induced some local irritation, which, however, soon passed away. In most of these cases the efficacy of the ergotin was very prompt, when other hæmostatics had previously been tried unsuccessfully. In only one of them did it fail.

In two cases of epistaxis the effect was very speedy, and the dose required very small. In a case of hæmatemesis, the bleeding was arrested promptly, after the internal administration of ergotin had been employed without benefit. In one case of intestinal hæmorrhage, occurring in typhus, the bleeding was completely arrested; in another case it persisted.

Dr. Drasche is convinced, from his experience, that ergotin is as efficacious as it is an easily employed remedy. Even if its effects are, in many cases, temporary, yet is the gain very considerable; and where it has been wholly inefficacious, the extent and nature of the lesion offer the explanation.

The best vehicle for the ergotin is glycerine, and the proportion of five grains to the drachm is most suitable. One fifth part of this may be injected once or twice a day. The region of the pectoral muscles is the best locality for the injection.

The Use of Post Partum Binders.—At a recent meeting of the Obstetrical Society of Edinburgh, a somewhat remarkable paper was read by Dr. Cairns, opposing the use of binders after parturition, and, what is the strangest of all, his extraordinary views appear to have met with very general approbation from the members present.

The disadvantages in the use of binders enumerated by Dr. Cairns are as follows:—

1st. That their application entails unnecessary trouble upon the accoucheur. Dr. Cairns confesses that when he first entered upon practice, it cost him more trouble to apply the binders in many cases than to deliver either the child or placenta.

2d. That their application unnecessarily exposes the patient, which, if several persons are present, may thereby shock her moral sensibilities; it may, moreover, expose her to currents of cold air, which, on her part, may lead to the most disastrous results.

3d. Post partum binders impede the circulation, slipping far above

the region of the uterus, thus interfering with the venous circulation, and thus tending to aggravate two diseases very common in pregnant women, viz., varicose veins and hæmorrhoids.

4th. They are rarely of proper form. They should properly extend from the ensiform cartilage to a considerable way beyond the nates.

5th. In cases of post partum hæmorrhage, the patient may die before the binder can be removed in order to apply the proper remedies for its arrestment.

Dr. Cairns, in conclusion, compares parturition in civilized and uncivilized conditions, and those two with the parturition of the lower animals. The latter, he affirms, owing to their pendent bellies, evidently require binders much more than women.

The New Hæmatozoon.—The *Med. Times and Gazette*, March 8, 1873, calls attention to the hæmatozoon discovered by Dr. Lewis, of the Indian Medical Service. The parasite is described as a filaria, and in certain respects is not dissimilar to the trichina, though smaller. It was found in the blood of patients the subject of chyluria, and is supposed to be the cause of this malady.

The importance of the discovery is unquestionable, but the exact history of this parasite has not yet been made out. It is enclosed in a kind of sheath, and this is supposed, by Dr. Cobbold, to indicate that the animal has already entered upon one of those phases of its existence, through one or more of which it is necessary that it should pass before it becomes sexually mature. This gentleman holds that the various species of filaria are merely provisional states of hematoid worms, and that they assume the forms of these mature worms in some other animal, probably carnivorous, or, it may be, in man himself.

The fact that worms are contained in the urine in chyluria is not new, it having been discovered at Bahia some years ago, for this malady of chylous urine is common in Brazil; but that they are to be found in the blood in all cases of the disease is a new observation. The chylous appearance of urine is, no doubt, due to the presence of small particles of oil in this fluid, but how the presence of certain parasites in the blood can give rise to particles of fat in the urine is by no means self-evident. It has been recognized for some time that the endemic hæmaturia of the Cape and Natal is due to a parasite in the kidney called bilharzia, and we could understand how such beings might give rise to bleeding from the vessels of the kidney; but the causation of chyluria by this filaria is difficult to understand, though the connection is unmistakable.

Ether Spray as a Means of Diagnosis.—Ether in the form of spray has recently been employed to determine the degree of sensibility in a case of obscure paralysis, and with the following result:—

The affected parts when subjected to the jet of atomized ether were found to be frozen at the end of two or three seconds, whereas the other portions of the body, as well as the corresponding parts of another healthy individual, could not be frozen in this manner in less than eight or nine seconds.—*Lyon Medical.*

Medical Miscellany.

THE Board of Trial of the Massachusetts Medical Society met at 11 A.M., April 29th, to try certain homœopathic members. We go to press while the affair is in progress. So far it has been characterized by the efforts of the accused to introduce reporters and lawyers, and, these failing, to raise legal quibbles. In our next issue, we hope to give a report of the proceedings.

M. TARLET has made a bequest of 10,000 francs to the Paris Academy of Medicine, for the purpose of founding a prize on mental and nervous diseases.

ANOTHER human skeleton, though less perfect than the former one, has been found in a cave at Mentone. Bracelets of shells were found on the arms, and near the skeleton were bone implements and drawings of animals.

TREATMENT OF DIABETES BY ARSENIC.—M. Fovelle recommends the internal use of arsenic as a cure for diabetes. He does not use it in the extreme condition of the disease, but in the earlier stage he believes it of undoubted use. He commences with the administration of Forster's solution, night and morning, and continues its administration for three or four months.—*The Medical Press and Circular*, April 9th, 1873.

THE Brompton Hospital for Consumption, in London, consumes two thousands gallons of cod-liver oil annually. Lead, turpentine and gallic acid are the sheet-anchors for hæmoptysis in that institution.—*Canada Medical and Surgical Journal.*

RICHARD PARTRIDGE, F.R.S., a well-known surgeon and anatomist of London, Professor of Anatomy for twenty years to the Royal Academy of Arts, and for twenty-six years to King's College Hospital, died recently, aged 68. He was one of the surgeons summoned to attend Garibaldi after the battle of Aspromonte, but failed to find the ball which Nélaton afterwards detected with his porcelain-tipped probe.—*Medical Times.*

HOW TO DISCOVER ALUM IN BREAD.—One drop of the alcoholic extract of logwood let fall upon pure bread or pure flour gives a brownish-yellow. If the flour contain alum in the proportion of one or two per cent., the color is gray or grayish-violet; with one-half per cent., the spot is yellowish-red, with a border of bluish-gray, and little blue points may be discovered in the disc with a lens; with one-fourth per cent., the bluish border is no longer visible, but the points may be still detected. This is the limit of the reaction.—*Science pour Tous—Mouvement Médicale*, March 29, 1873.

AT a stated reunion of the Medical Library and Journal Association of New York, held April 18, 1873, Dr. John C. Peters, President, in the chair, the following preamble and resolutions were presented and adopted:—

Whereas, This Association, having learned of the death of Josiah C. Nott, M.D., a successful and honored physician, both in the northern and southern sections of our country; therefore,

Resolved, That in the death of Dr. Nott we recognize the loss of one of our most devoted members; a gentlemen eminent for his high integrity and his unblemished character, distinguished alike as an ethnologist, gynæcologist, and surgeon, and by his untiring zeal for the advancement of medical science.

Resolved, That, as an expression of our sympathy with his afflicted family, a copy of these resolutions be transmitted to them and published in the medical journals; also entered on the minutes of this Association.

WILLIAM N. BLAKEMAN, M.D.,
BENJAMIN I. RAPHAEL, M.D.,
BRADFORD S. THOMPSON, M.D. } *Committee.*

THE MEDICAL SCHOOL OF MONTPELLIER.—The French Government has closed this school entirely, owing to disturbance among the students. It appears that some student addressed a letter to the Mayor of Carcasonne, protesting against a judicial sentence pronounced against him. During the subsequent deliberation of the Academic Council, the students assembled and interrupted the lectures which were being given, and repeated the disturbance next day. Hence the closure of the Medical and Pharmaceutical Schools.—*Medical and Surgical Reporter.*

MEDICAL COLLEGE OF THE STATE OF SOUTH CAROLINA.—This institution closed a very successful session early in March. The Faculty have every reason to be highly gratified with the results of their efforts during the past year. After a severe struggle with the numerous obstacles developed by the unfortunate condition of our Southern country, the school has been re-established upon a secure basis. The scheme of a gratuitous course of instruction, forced upon the institution by the exigencies of the times, and considered only a temporary necessity, has worked well, and will be continued the coming session. The general intelligence of the late class was fully up to the usual average, and the standing of the graduates was more than encouraging. The cordial support and hearty approval given to the faculty by members of the profession in this and adjoining States we know is fully appreciated, and must exercise a potent influence upon the welfare of this time-honored and once popular school.—*Charleston Medical Journal.*

HYDROPHOBIA.—From an official report, it appears that in England and Wales, in 1869, there were thirty-two deaths from hydrophobia, all the cases occurring north of the Trent. According to this report, hydrophobia is periodic in its character. Statistics for the last thirty-two years in reference to this disease are cited in support of this theory.—*Med. and Surg. Reporter.*

ANSWERS TO CORRESPONDENTS.

[M.D.]—TULLY'S POWDER.—

R. Morphiæ sulphatis, gr. i.;
Glycyrrhizæ pulv.,
Cretæ præparatæ,
Camphoræ, aa grs. xx. M.

We have reason to believe that it occasionally contains a larger proportion of morphia.
EDS.

MORTALITY IN MASSACHUSETTS.—*Deaths in fourteen Cities and Towns for the week ending April* 19, 1873.

Boston, 153—Charlestown, 11—Worcester, 13—Lowell, 20—Milford, 2—Chelsea, 4—Cambridge, 19—Salem, 7—Lawrence, 11—Lynn, 11—Fitchburg, 3—Newburyport, 2—Somerville, 9—Fall River, 33. Total, 298.

Prevalent Diseases.—Consumption, 56—pneumonia, 36—cerebro-spinal disease, 32—scarlet fever, 22.

Three deaths from smallpox are reported: two in Boston and one in Cambridge. Deaths from cerebro-spinal disease are reported as follows:—Sixteen in Boston, four in Lowell, three in Cambridge, three in Lynn, two in Worcester, two in Fall River, one in Charlestown, one in Salem.

GEORGE DERBY, M.D.,
Secretary of the State Board of Health.

DEATHS IN BOSTON for the week ending Saturday, April 26th, 137. Males, 65; females, 72. Accident, 3—abscess, 1—apoplexy, 1—anæmia, 1—bronchitis, 1—congestion of the brain, 1—disease of the brain, 3—cancer, 2—cerebro-spinal meningitis, 14—consumption, 24—convulsions, 3—croup, 1—debility, 2—dropsy, 1—dropsy of the brain, 2—diphtheria, 1—scarlet fever, 5—disease of the heart, 6—hæmorrhage, 1—insanity, 1—inflammation of the knee-joint, 1—intemperance, 1—disease of the kidneys, 2—disease of the liver, 3—inflammation of the lungs, 16—marasmus, 8—old age, 5—paralysis, 2—premature birth, 2—peritonitis, 2—puerperal disease, 2—quinsy, 1—rheumatism, 2—smallpox, 3—suicide, 1—teething, 6—unknown, 6.

Under 5 years of age, 51—between 5 and 20 years, 13—between 20 and 40 years, 33—between 40 and 60 years, 20—over 60 years, 20. Born in the United States, 90—Ireland, 31—other places, 16.